Evaluation Criteria

Prepared for:

Alaska Department of Transportation & Public Facilities

and

Municipality of Anchorage

Prepared by:

HDR Alaska, Inc.

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List of Acronyms

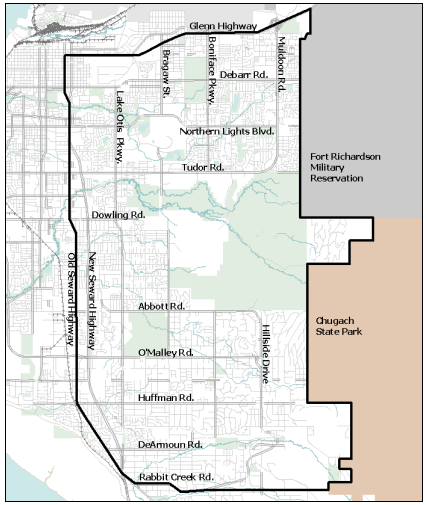
AASHTO	American Association of State Highway and Transportation Officials
ADT	average daily traffic
AMATS	Anchorage Metropolitan Area Transportation Solutions
AWMP	Anchorage Wetlands Management Plan
CO	carbon monoxide
DOT&PF	Alaska Department of Transportation and Public Facilities
EAST	East Anchorage Study of Transportation
FDOT	Florida Department of Transportation
HDR	HDR Alaska, Inc.
ICU	Intersection Capacity Utilization
ISER	Institute of Social and Economic Research
ITE	Institute of Transportation Engineers
LOS	Level of service

LRTP	Long Range Transportation Plan
MOA	Municipality of Anchorage
TCRP	Transit Cooperative Research Program
VMT	vehicle miles traveled

Introduction

The objective of the East Anchorage Study of Transportation . . .

Develop long-range solutions to maintain and enhance future travel mobility within and through East Anchorage.



East Anchorage Study Area

The focus of Evaluation Criteria Report

Propose evaluation criteria and performance measures for application in the analysis phase of EAST.

Study Overview

State and local officials commissioned the East Anchorage Study of Transportation (EAST) to examine transportation improvements for the East Anchorage study area.[1] The study's objective was to identify current problems; forecast future transportation demands and deficiencies (through the year 2023); and then analyze approaches to improve our ability to travel safely and efficiently within and through the study area. The study focused on accessibility, mobility, and public safety, as well as relieving congestion at major eastside intersections. The end product will provide data and analysis to help plan future public transportation, sidewalk, trail, and road improvements. Findings from EAST will be used, in part, to prepare Anchorage's long-range transportation plan (LRTP).

The following list highlights EAST phases:

- Transportation and Mobility Data Gathering and Analysis
- Problem Identification and Study Objectives
- Alternative Development and Evaluation
- Study Recommendations

Focus of the Evaluation Criteria Report

This report lays out proposed evaluation criteria to be used in the assessment and refinement of Anchorage's future transportation system. In this report, the study team translates goals and objectives, articulated in the report titled "Goals and Objectives Analysis" (DOT&PF and MOA August 2002), into criteria that will be used to evaluate EAST data on our future conditions. The evaluation criteria will be used in part to measure the relative effectiveness of the alternatives and to provide decision-makers with technical findings to support their decisions. It is important to have information on our future conditions to help determine if solutions are feasible, that they meet transportation and other goals, and that they address the identified problems. It is equally important that community needs and values are included in the evaluation of data about future conditions.

The specific objectives of this report are to:

- Develop criteria that translate community goals and objectives into meaningful measures.
- Involve the public and decision-makers in the articulation and review of appropriate evaluation measures.
- Develop criteria that are comprehensive and measurable.
- Identify data needs required of each measure.

[1] Defined as the geographic area bounded by the Glenn Highway to the north, Rabbit Creek Road to the south, the Old Seward Highway to the west, and the Ft. Richardson Military Reservation and Chugach State Park to the east.

Collector/Arterial Roadways

Criteria to be Measured:

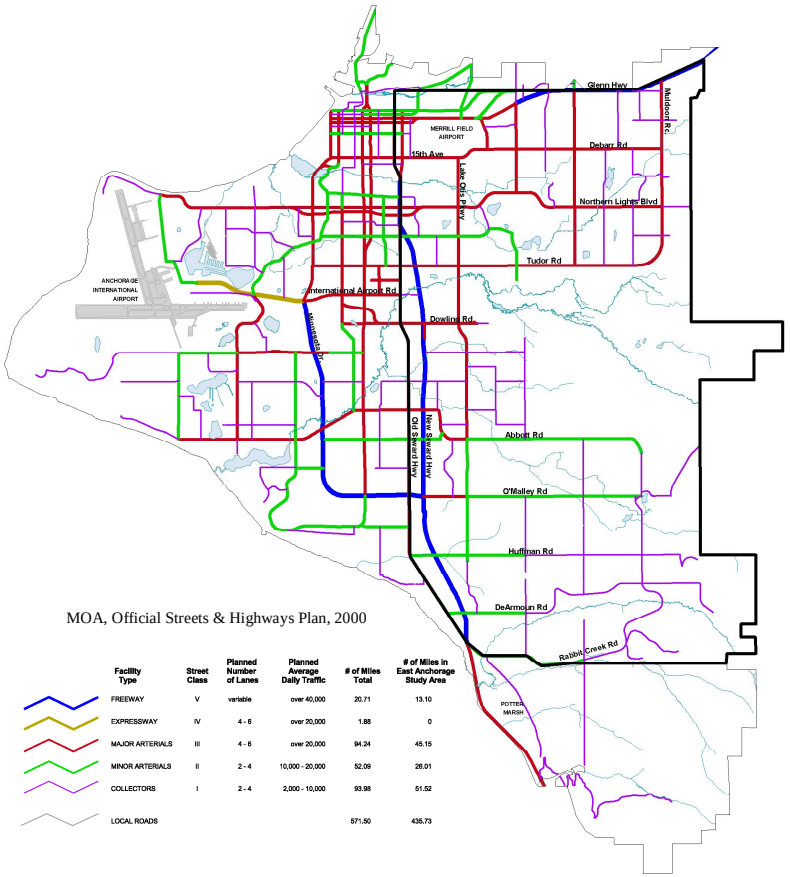
- Traffic Volumes
  - Average daily traffic.
  - Change in average daily traffic as compared to the base case conditions.
- MOA Transportation Model Performance Measures
  - Daily and annual vehicle miles traveled.
  - Daily and annual vehicle hours traveled.
  - Average speed.
  - Daily and annual delay.
- Congestion - Level of Service
  - Road segment level of service.
  - Intersection level of service.

> ***Long Range Transportation Plan Goal:*** *Increase transportation system efficiency during peak-hour periods. (MOA, April 2001, p. 10)*

> ***Long Range Transportation Plan Goal:*** *Provide a comprehensive roadway network that moves people and goods in an economical, efficient, and safe manner. (MOA, April 2001, p. 10)*

This map depicts the "base case" collector and arterial network. The base case consists of the road network that is built or is approved to be built. The base case presents the situation if we make no changes to our transportation system. Transportation alternatives will be evaluated against this network to examine the effects improvements would have on our mobility with anticipated population and employment growth over the next 20 years.

Traffic Volume. Average daily traffic represents the average number of cars traveling on a given roadway segment each day. Average daily traffic (ADT) for segments will be estimated using the MOA's Anchorage Transportation Model for collector and arterial roadways for each of the alternatives. To highlight the geographic areas of traffic change resulting from the various alternatives, the change in ADT as compared to the base case will be calculated and displayed for each of the alternatives. Traffic volumes will be estimated and depicted for all model runs of the MOA's Transportation Model.



MOA, Official Streets & Highways Plan, 2000

Facility Type	Street Class	Planned Number of Lanes	Planned Average Daily Traffic	# of Miles Total	# of Miles in East Anchorage Study Area
FREEWAY	V	variable	over 40,000	20.71	13.10
EXPRESSWAY	IV	4 - 6	over 20,000	1.88	0
MAJOR ARTERIALS	III	4 - 6	over 20,000	94.24	45.15
MINOR ARTERIALS	II	2 - 4	10,000 - 20,000	52.09	26.01
COLLECTORS	I	2 - 4	2,000 - 10,000	93.98	51.52
LOCAL ROADS				571.50	435.73

Transportation Model Performance Measures. To gauge the performance of the transportation system across the entire network a number of performance statistics from the MOA's Anchorage Transportation Model will be reported. Vehicle miles traveled is a measure of the number of miles traveled by all vehicles on the network in a given period of time. Vehicle hours traveled is an estimate of the number of hours spent traveling by all vehicles on the network over a given time period. Average speed is a measure of the average speed of travel of all vehicles over the entire network, including time stopped or delayed in traffic. Delay is the difference in the time it takes for all trips cumulatively across the network under modeled (with anticipated congestion) conditions as compared to the time to make the trips if they had occurred under uncongested conditions. Model performance measures will be calculated for all Anchorage Transportation Model runs in the report titled "Alternatives Development and Evaluation Report" (DOT&PF and MOA May 2003).

Level of service refers to a standard measurement used by transportation officials which reflects the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS A and congested conditions rated as LOS F.

Congestion – Level of Service. To describe the operational efficiency of a given intersection or roadway segment, transportation planners have defined a range of qualitative service levels, tied to quantitative measurements, to characterize traffic conditions called level of service (LOS). LOS C has generally been established as the standard for design of transportation facilities for peak hour traffic conditions. LOS D, however, is often accepted in urbanized areas (such as Anchorage) where the costs or impacts of providing LOS C are prohibitive. Levels E or F indicate problem areas. Areas currently experiencing LOS D are areas of concern. If growth continues in the patterns we have seen, problems will likely occur in the future.

Long Range Transportation Plan Goal: *Improve non-project arterial intersection capacity by 15% for at least 5 intersections per year. (MOA, April 2001, p. 11)*

Signalized Arterial LOS Thresholds
Measured in Average Daily Traffic

Lanes	Divided	Level of Service					
		A	B	C	D	E	F
2	Undivided	< 2,000	2,001 -7,000	7,001 - 13,800	13,801 - 19,600	19,601 - 27,000	> 27,001
4	Divided	< 22,000	22,001 - 36,200	36,201 - 51,700	51,701 - 65,400	65,401 - 73,800	> 73,801
6	Divided	< 34,100	34,101 - 55,700	55,701 - 79,500	79,501 - 100,700	100,701 - 113,600	> 113,601
8	Divided	< 48,700	48,701 - 79,900	79,901 - 113,400	113,401 - 142,300	142,301 - 160,000	> 160,001
10	Divided	< 61,600	61,601 - 100,900	100,901 - 143,400	143.401 - 179,800	179,801 - 202,000	> 202,001
12	Divided	< 74,400	74,401 - 122,000	122,001 - 173,200	173,201 - 217,300	217,301 - 244,200	> 244,201

Source: FDOT, and HDR

Unsignalized Arterial LOS Thresholds
Measured in Average Daily Traffic

Lanes	Divided	Level of Service					
		A	B	C	D	E	F
2	Undivided	--	<3,100	3,100 - 8,200	8,201 - 13,800	13,801 - 15,300	> 15,300
4	Undivided	< 4,300	4,301 - 11,000	11,001 -18,700	18,701 - 24,000	24,001 - 27,500	> 27,500
4	Divided	< 4,800	4,801 - 18,500	18,501 - 25,700	25,700 - 35,100	35,101 - 41,500	> 41,500
6	Divided	< 7,300	7,301 - 25,600	25,601 - 32,900	32,901 - 48,000	18,001 - 49,500	> 49,500
8	Divided	< 9,400	9,401 - 33,300	33,301 - 42,800	42,801 - 62,600	62,601 - 64,300	> 64,300

Source: FDOT, and HDR

Long Range Transportation Plan Goal: *Provide a roadway network that operates at a Level of Service (LOS) D or better for 95% of the projected 2023 travel demands. (MOA, April 2001, p. 11)*

Segment Level of Service. Roadway level of service can be measured in terms of the volume of traffic it is carrying relative to its capacity to handle that volume. The top table depicts the LOS thresholds measured in terms of average daily traffic for signalized arterials, while the lower table depicts the LOS thresholds for uninterrupted highways and freeways. These tables identify LOS thresholds based on LOS tables developed by Florida's Department of Transportation (FDOT) and modified for Anchorage conditions. These values provide a planning level relationship between the number of lanes along a particular roadway and the general LOS that can be expected. It should be noted that the LOS thresholds for one-way streets would be approximately 40% higher than those listed in the tables. Segment level of service will be analyzed for the base conditions in the report titled "Forecast" (DOT&PF and MOA January 2003) and each of the MOA Transportation Model runs in the report titled "Alternatives Development and Evaluation" (DOT&PF and MOA May 2003).

LOS Definitions

A	Free flow with low volumes of traffic and speeds controlled by the speed limits.
B	Stable flow, but drivers have reasonable freedom to select speed and land of operation.
C	Stable flow, but most drivers are restricted in their freedom to select speed or change lanes.
D	Approaching unstable flow with little room to maneuver.
E	Volume at capacity, unstable flow with momentary disruptions and stops.
F	Forced flow, stops, low speeds.

Source: AASHTO, 2001 and ITE 1992

Intersection Level of Service. To evaluate how well our intersections are functioning we will rely on a methodology based on "Intersection Capacity Utilization" (ICU). Intersection Capacity Utilization provides a planning level method to calculate an intersection's level of service by evaluating the critical movements volumes at the intersection. The methodology is well suited for traffic planning purposes but is not intended for operations or signal timing design. The analysis will not provide a complete picture of intersection performance, but it will give good planning level analysis of the intersection's volume related to its capacity. Intersection LOS will be calculated for the base conditions in the report titled "Forecast" (DOT&PF and MOA January 2003). ICU is determined on an A-H scale as follows:

ICU	LOS	LOS Definitions
0 to 60%	A	The intersection has no congestion. A cycle length of 80 seconds or less will move traffic efficiently. All traffic should be served on the first cycle. Traffic fluctuations, accidents, and lane closures can be handled with minimal congestion. This intersection can accommodate up to 40% more traffic on all movements.
>60% to 70%	B	The intersection has very little congestion. Almost all traffic will be served on the first cycle. A cycle length of 90 seconds or less will move traffic efficiently. Traffic fluctuations, accidents, and lane closures can be handled with minimal congestion. This intersection can accommodate up to 30% more traffic on all movements
>70% to 80%	C	The intersection has no major congestion. Most traffic should be served on the first cycle. A cycle length of 100 seconds or less will move traffic efficiently. Traffic fluctuations, accidents, and lane closures may cause some congestion. This intersection can accommodate up to 20% more traffic on all movements.
>80% to 90%	D	The intersection normally has no congestion. The majority of traffic should be served on the first cycle. A cycle length of 110 seconds or less will move traffic efficiently. Traffic fluctuations, accidents, and lane closures can cause significant congestion. Sub optimal signal timings cause congestion. This intersection can accommodate up to 10% more traffic on all movements.
>90% to 100%	E	The intersection is right on the verge of congested conditions. Many vehicles are not served on the first cycle. A cycle length of 120 seconds is required to move all traffic. Minor traffic fluctuations, accidents, and lane closures can cause significant congestion. Sub optimal signal timings can cause significant congestion. This intersection has less than 10% reserve capacity available.
>100% to 110%	F	The intersection is over capacity and likely experiences congestion periods of 15 to 60 minutes per day. Residual queues at the end of green are common. A cycle length over 120 seconds is required to move all traffic. Minor traffic fluctuations, accidents, and lane closures can cause increased congestion. Sub optimal signal timings can cause increased congestion.
>110% to 120%	G	The intersection is 10% to 20% over capacity and likely experiences congestion periods of 60 to 120 minutes per day. Long queues are common. A cycle length over 120 seconds is required to move all traffic. Motorists may be choosing alternate routes, if they exist, or making fewer trips during the peak hour. Signal timings can be used to "ration" capacity to the priority movements.
>120%	H	The intersection is 20% over capacity and could experience congestion periods of over 120 minutes per day. Long queues are common. A cycle length over 120 seconds is required to move all traffic. Motorists may be choosing alternate routes, if they exist, or make fewer trips during the peak hour. Signal timings can be used to "ration" capacity to the priority movements.

Source: Intersection Capacity Utilization 2000: A Procedure for Evaluating Signalized Intersections. Trafficware Corporation. 2000.

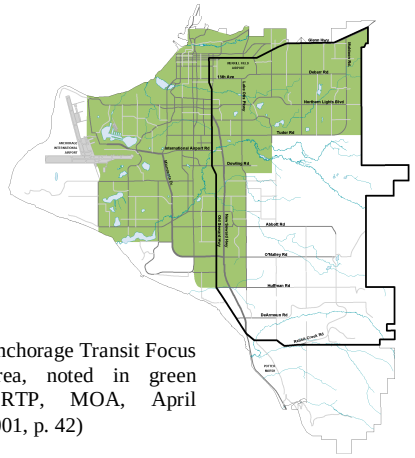
Transit Environment Measures

Criteria to be Measured or Assumed:

- Service frequency level of service (LOS).
- Ridership and mode share.
- Accessibility: Percent of transit focus area population within ¼ mile of transit routes.
- Service coverage as a percent of the transit focus area.
- Projected density of housing along transit-supportive development corridors.

> ***Long-Range Transportation Plan Goal:*** *Develop a safe, reliable, and accessible transit system that provides a viable alternative to the automobile. (MOA, April 2001, p. 10)*

> ***"Anchorage 2020" Transportation Choices Goal:*** *An efficient transportation system that offers affordable, viable choices among various modes of travel that serve all parts of the community. (MOA, February 2001, p. 38)*



Anchorage Transit Focus Area, noted in green (LRTP, MOA, April 2001, p. 42)

Service Frequency. This measure refers to the number of times per hour that a rider has access to a bus. For traffic modeling, a service schedule will be assumed to include a minimum of two busses per hour (LOS D). Transit supportive development corridors will be assumed to operate at LOS C during peak periods (15 minute headways).

Service Frequency Level of Service (LOS)
Urban Scheduled Transit Service

LOS	Headway* (minutes)	Busses/ Hour	Explanation
A	< 10	>6	Passengers don't need schedules
B	10-14	5-6	Frequent service, passengers consult schedules
C	15-20	3-4	Maximum desirable time to wait if bus missed
D	21-30	2	Service unattractive to choice riders
E	31-60	1	Service available during the hour
F	>60	<1	Service unattractive to all riders

* Headway is the time between departure of one bus and arrival of another.
Source: TCRP, January 1999, pp. 5-16

Ridership and Mode Share. The modal split or mode share for transit is the proportion of person trips attributed to transit as compared to private vehicles. The "2001 Anchorage Bowl Long Range Transportation Plan" has an objective of increasing transit ridership by 200% (MOA April 2001, p. 10). The increase in transit ridership and mode share will be measured in the model for base conditions and supplemental transit service overlays will be recommended and assumed to be in place to achieve the 200% increase in transit ridership called for in the LRTP.

Accessibility. Accessibility refers to the ability to get to and from a transit stop/station by other modes. Research indicates that people living more than ¼ mile from a transit route tend to be discouraged from riding (they find it less accessible) and ridership levels drop off noticeably. Accessibility was measured for existing conditions and found to already achieve our LRTP goals. Accessibility will be exceeded by the assumed service increases.

Service Coverage. Service coverage is a measure of the area within walking distance of transit routes as compared to the entire "transit focus area." Analysis indicates that we provide service coverage at LOS B. Additional service, proposed in the study, would improve upon that measure.

Level of Service	% of Transit Supportive Area Covered
A	90.0 – 100.0
B	80.0 – 89.9
C	70.0 – 79.9
D	60.0 – 69.9
E	50.0 - 59.9
F	<50.0

Source: TCRP January 1999

Transit Corridor Housing Density. "Anchorage 2020" (MOA February 2001) calls for housing density in transit corridors to be greater than 8 dwelling units per acre. For each alternative such density will be assumed and modeled as part of base case conditions.

Bikes and Pedestrians

Criteria to be Measured:

- Residential accessibility. Percent of transit area focus population with maintained sidewalks/trails within ¼ mile of homes.
- Biking and walking mode share.

> ***Long Range Transportation Plan Goal:*** *Provide and maintain complimentary transportation facilities that support alternatives to car usage. (MOA, April 2001, p. 11)*

"Anchorage 2020" (MOA February 2001) calls for transportation improvements to be balanced among transit, pedestrian, and road improvements and to make transit more attractive by making it more accessible. The plan calls for considerable investment in pedestrian and bicycle facilities to create a more walkable transportation environment. The study team is assuming that such improvements will be built and is modeling roadway and transportation systems with a high level of pedestrian facilities assumed in the base case. For example, transit supportive development corridors, town centers, redevelopment areas, and employment centers will be assumed and modeled to have full pedestrian networks. Additional pedestrian connections will be designed into the transportation alternatives.

Residential Accessibility. The 2001 LRTP calls for maintained sidewalks or trails to within ¼ mile of 80% of the transit focus area population. To gauge how well the Anchorage meets this goal, the percentage of transit focus area population with maintained sidewalks/trails within ¼ mile of homes was calculated. Nearly 85% of the transit focus area households have a maintained sidewalk within ¼ mile of their residence. Pedestrian and transit improvements assumed and modeled as part of the EAST alternatives would improve upon that measure.

Biking and Walking Mode Share. As we improve the biking and pedestrian network, we would also expect a growth in bicycle and walking trips. The MOA's Anchorage Transportation Model will be used to estimate the likely modal split for biking and walking under a number of innovative land use-transit scenarios. This measure, in combination with transit mode share measures, will assess the affect of land use, transit, and pedestrian improvements on the number of private vehicle trips.

Base case conditions include a high level of transit and land use improvements including all Anchorage 2020 pedestrian, land use, and transit improvements. Such conditions underlie all MOA Transportation Model runs. The study team will test additional, innovative transit and pedestrian improvements in a several land use-transit alternatives. See the report titled "Alternatives Development and Evaluation" (DOT&PF and MOA May 2003) for more details.

Neighborhood Traffic

Criteria to be Measured:

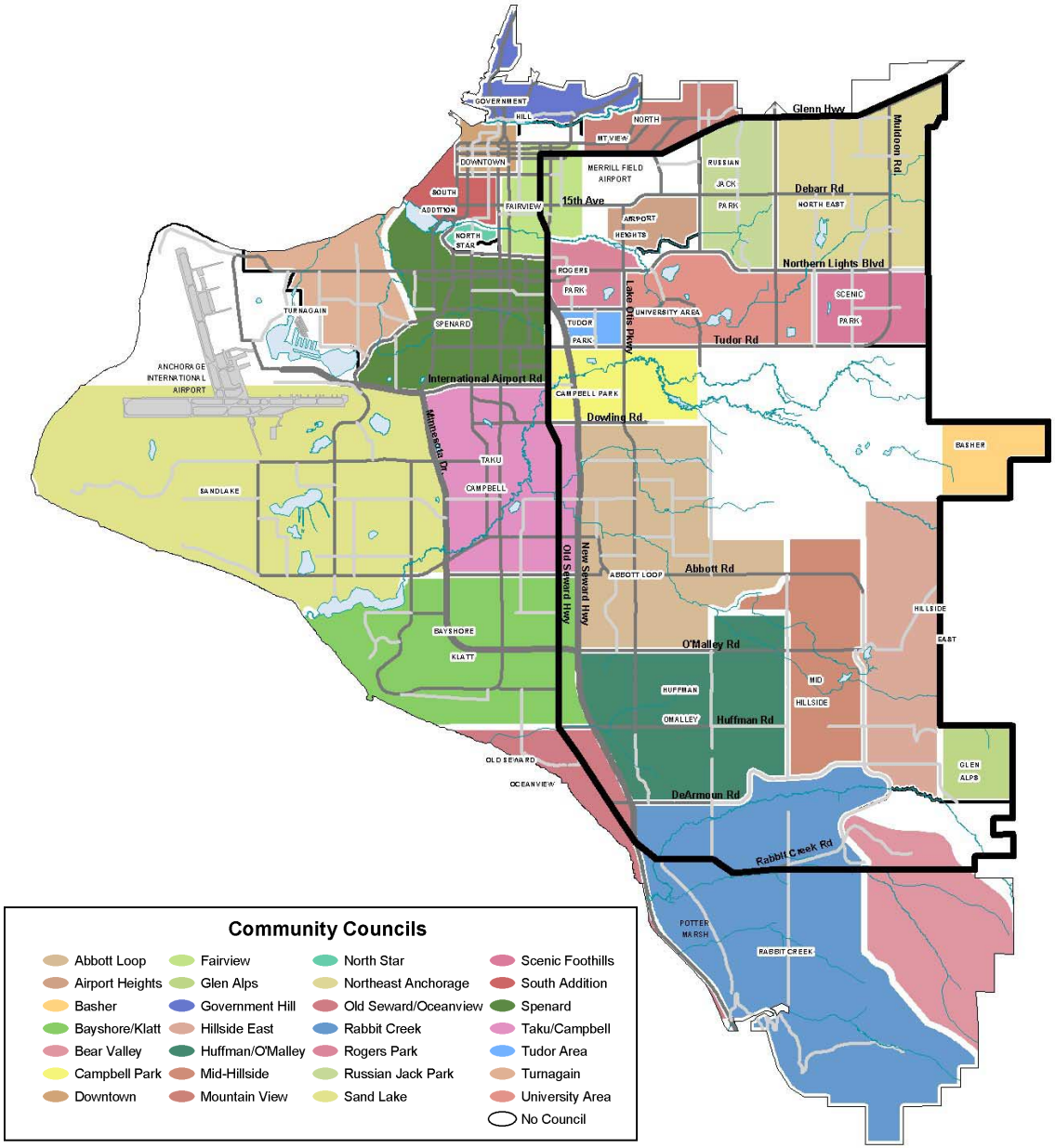
- Vehicle miles traveled within each community council area projected with each alternative.
- Change in vehicle miles traveled within each community council area projected with each alternative.

The need to maintain and improve the quality of our neighborhoods has been expressed consistently in Anchorage's planning documents over the years. Key issues in East Anchorage have been the effect of traffic on neighborhoods, traffic cutting through neighborhoods, and heavy traffic on arterials that surround neighborhoods. Each of the EAST alternatives will be evaluated to gauge the affect of traffic by neighborhood.

Traffic projections for each alternative will be prepared to gauge the level of traffic anticipated around town. Estimates of average daily traffic and annual vehicle miles traveled will be calculated and compared with the base case. This information will be presented by Community Council area.

> ***"Anchorage 2020" Neighborhood Identity and Vitality Goal:*** *A variety of safe, pleasant, and distinctive neighborhoods responsive to the diverse needs of residents, with good access to schools, recreation, natural areas, and community facilities. (MOA February 2001, p. 38)*

> *Neighborhood through-traffic movements are minimized. (Anchorage 2020, p. 48)*



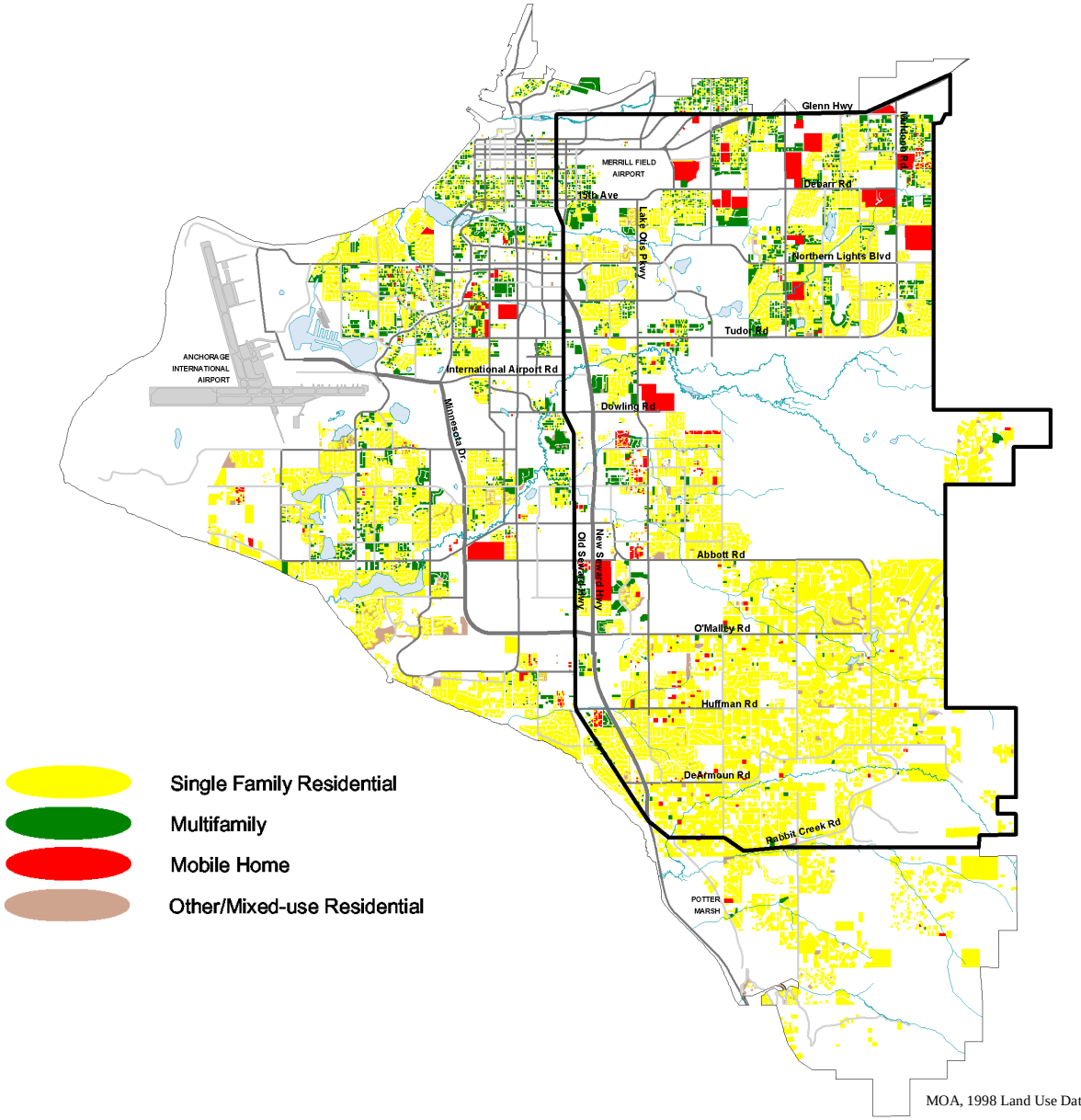
Housing

Criteria to be Measured:

- Number and type of residential parcels affected.

Transportation improvements often require additional rights-of-way to meet the goals and objectives of area plans. Acquiring the necessary land to add travel lanes, build roads, or construct transit and pedestrian facilities can affect residential properties. Recognizing the impact that residential impacts can have on our neighborhoods, the "2001 Anchorage Bowl Long Range Transportation Plan" (MOA April 2001) has as an objective to minimize residential relocations due to transportation projects.

This criterion will estimate, at a planning level, the number of residential parcels affected under each alternative's transportation system modifications. This effect will be calculated based on right-of-way requirements as promulgated in the Municipality of Anchorage's Department of Public Works Design Criteria Manual (2002, Chapter 1) and compared against the residential land use map (right) for each alternative evaluated.



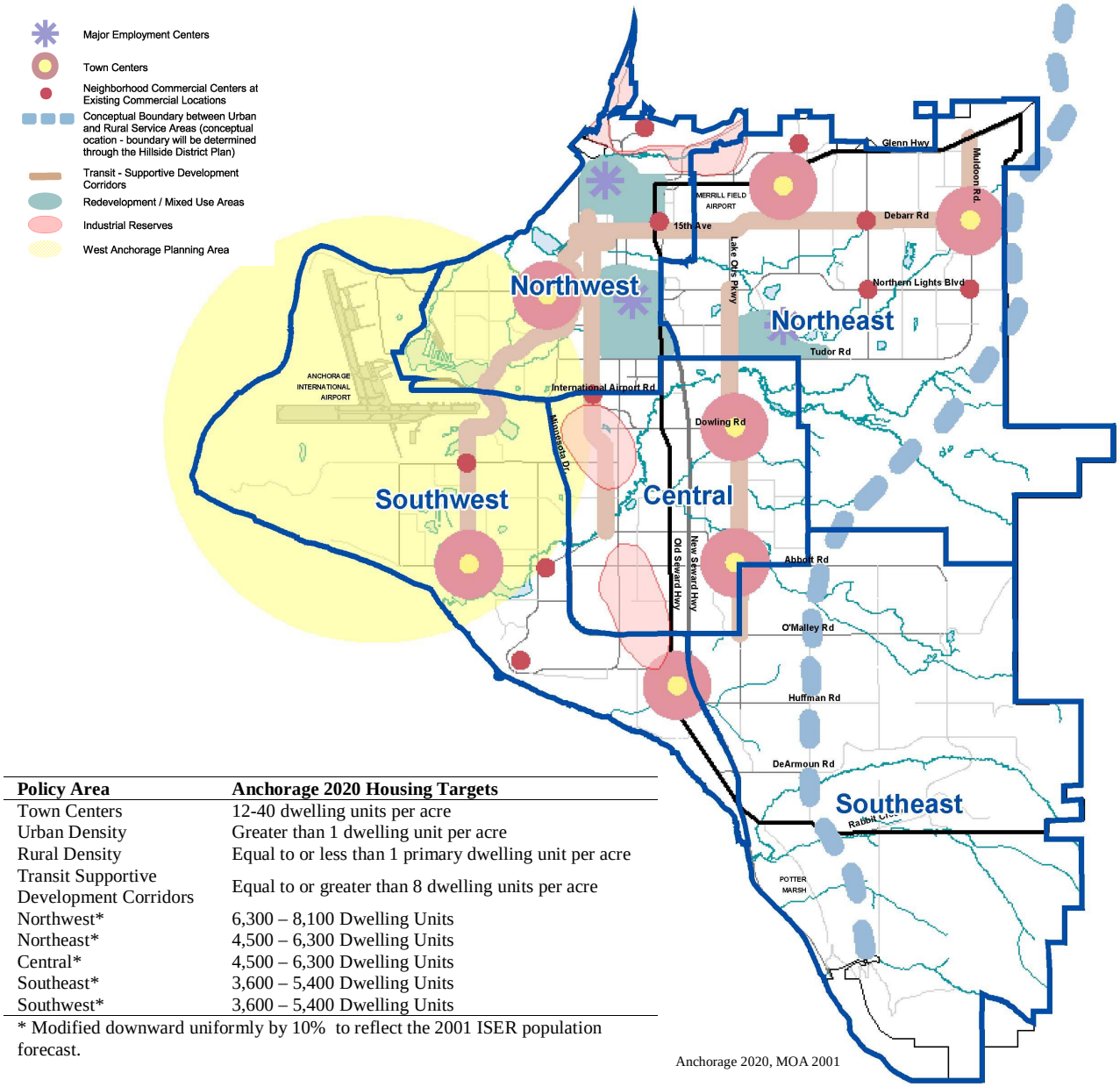
Housing Distribution

Criteria to be Used:

- Housing distribution by planning subarea.
- Residential density by "Anchorage 2020" Policy Areas.

Transportation system modifications can affect the accessibility characteristics and options of work, shopping, and other destinations, which occasionally can influence where residents choose to live. "Anchorage 2020" (MOA February 2001) calls for a variety of housing types and densities in neighborhoods to offer a choice of urban, suburban, and rural lifestyles.

Recognizing the relationship between transportation and housing, alternatives will be based on transportation and land use changes promulgated by "Anchorage 2020" and will be modeled using the housing distribution and density targets set forth by the plan. The housing distribution and density targets are identified in the table to the right.



Policy Area	Anchorage 2020 Housing Targets
Town Centers	12-40 dwelling units per acre
Urban Density	Greater than 1 dwelling unit per acre
Rural Density	Equal to or less than 1 primary dwelling unit per acre
Transit Supportive Development Corridors	Equal to or greater than 8 dwelling units per acre
Northwest*	6,300 – 8,100 Dwelling Units
Northeast*	4,500 – 6,300 Dwelling Units
Central*	4,500 – 6,300 Dwelling Units
Southeast*	3,600 – 5,400 Dwelling Units
Southwest*	3,600 – 5,400 Dwelling Units

* Modified downward uniformly by 10% to reflect the 2001 ISER population forecast.

Anchorage 2020, MOA 2001

Parks and Open Space

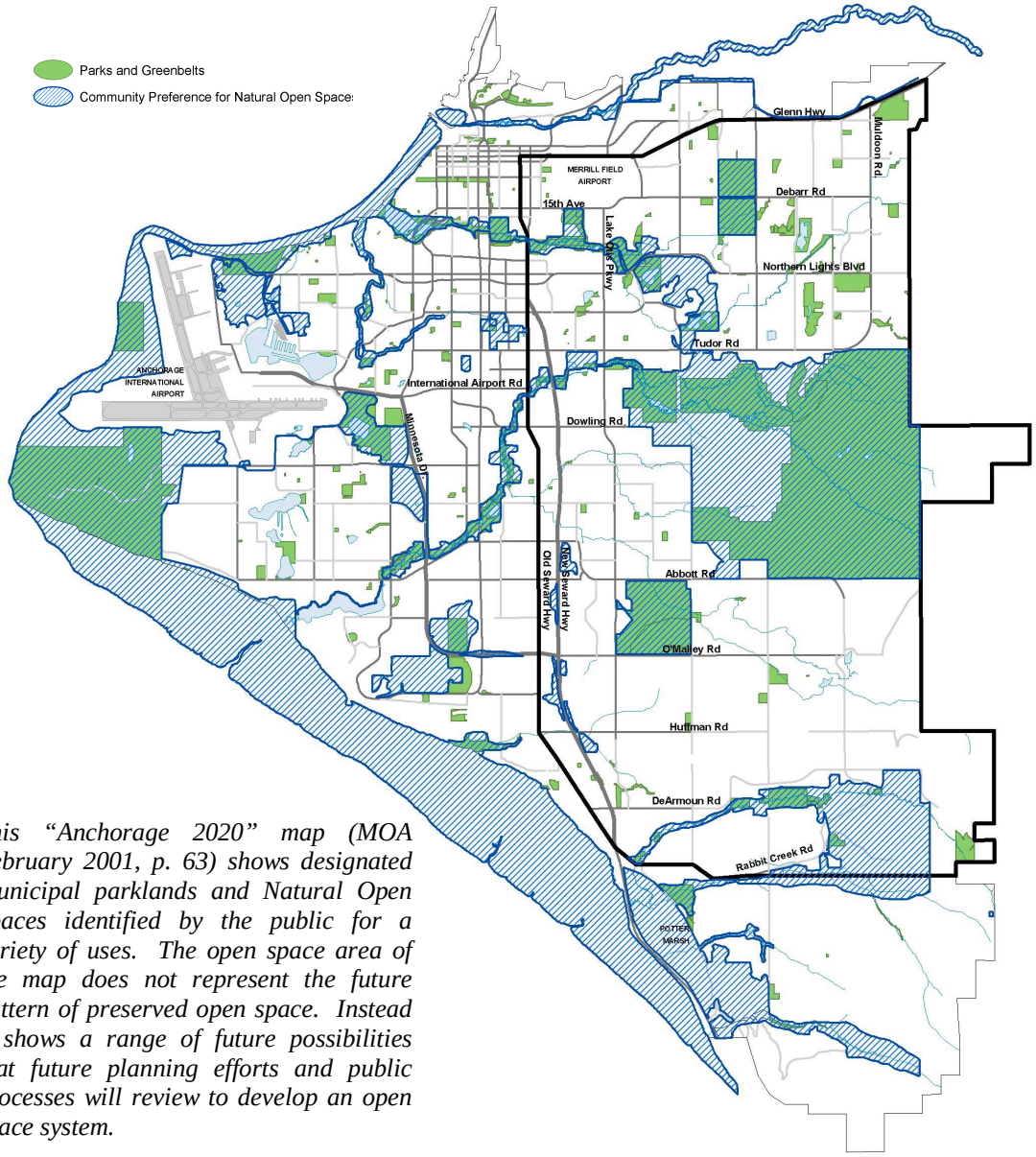
Criteria to be Measured:

- Acres and locations of dedicated parkland affected.
- Acres and locations of natural open spaces affected.

Community values and goals articulated in Anchorage planning documents illustrate the value Anchorage residents place on our parks, trails, and open spaces. The map (right) shows dedicated parks and an inventory of natural open spaces, regardless of ownership, that are important to the community.

> **"Anchorage 2020" Parks Trails, and Recreation Goal:** *A sustainable and accessible system of recreation facilities, parks, trails, and open spaces that meets year-round neighborhood and community-wide needs. (MOA February 2002, p. 39)*

These criteria will measure the acreage of (1) dedicated parkland and (2) the acreage of "Community Preferences for Natural Open Spaces" as defined in "Anchorage 2020" (p. 63) that might be required to develop the alternatives under consideration. Acreage needed for the transportation alternatives will be calculated based on right-of-way requirements defined in the Municipality of Anchorage's Department of Public Works Design Criteria Manual (2002, Chapter 1) calculated against the park and open space map (right) for each improvement evaluated.



This "Anchorage 2020" map (MOA February 2001, p. 63) shows designated Municipal parklands and Natural Open Spaces identified by the public for a variety of uses. The open space area of the map does not represent the future pattern of preserved open space. Instead it shows a range of future possibilities that future planning efforts and public processes will review to develop an open space system.

Wetlands

Criteria to be Measured:

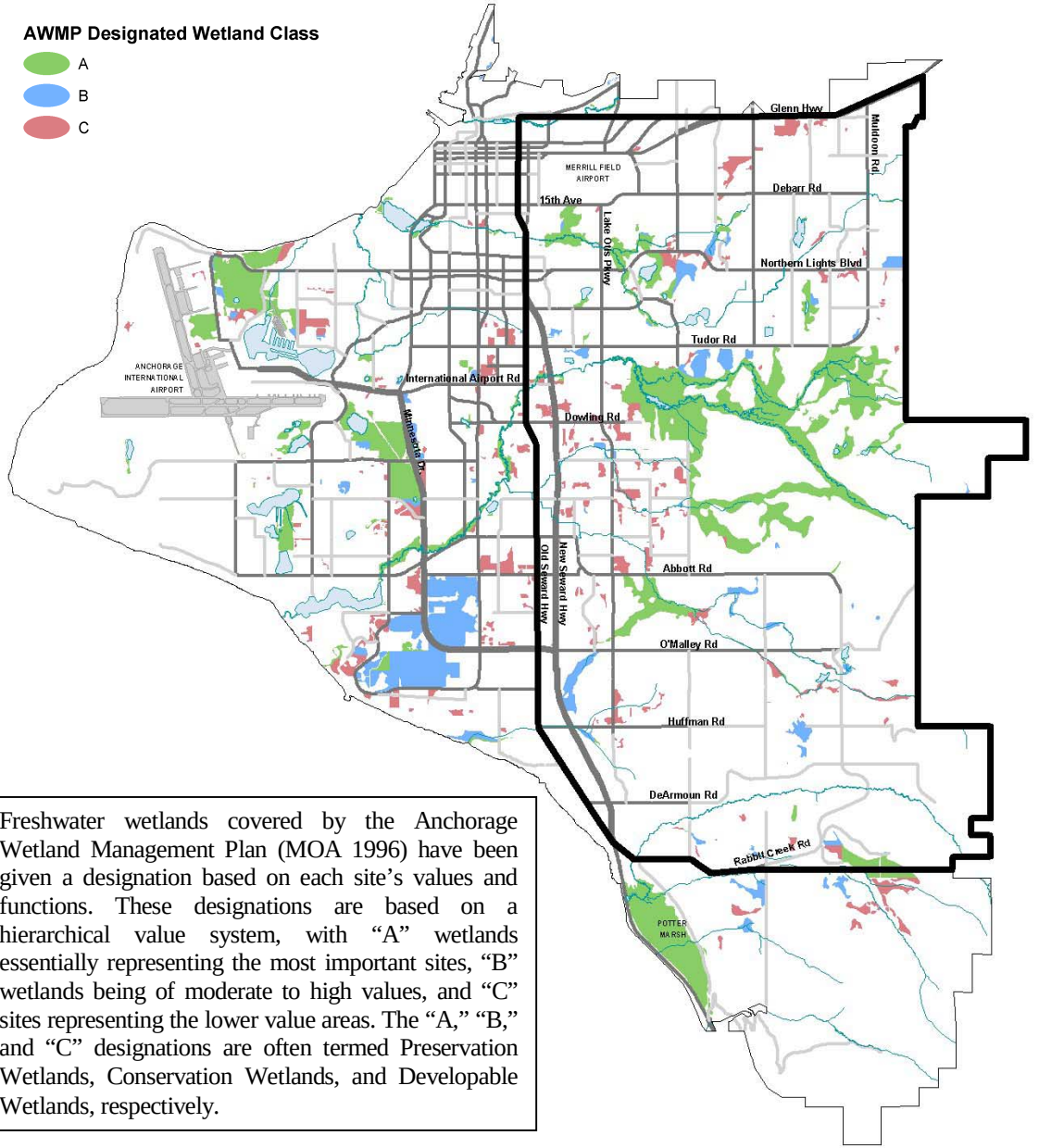
- Acres and locations of wetlands impacted.

According to the Anchorage Wetland Management Plan (AWMP) (MOA 1996), wetlands have important natural properties and functions including providing highly productive ecosystems that support fish and wildlife populations, modulating surface water flows, protecting water bodies from erosion, and purifying water.

> **"Anchorage 2020" Wetland Goal**: *A system of wetlands with functions and values that are preserved and enhanced. (MOA February 2001, p. 39)*

The plan indicates "construction of transportation corridors frequently alters natural drainage patterns. These changes, in turn, have the potential to modify natural movements of water, damage or destroy fish and wildlife habitat, adversely affect biological productivity, reduce flood storage capacity, or alter nutrient exchange characteristics" (p. 1).

This criterion will measure the amount and class (A, B, or C) of wetlands that might be required to develop the improvements under consideration. Wetland acreage needed for the transportation improvements will be calculated based on right-of-way requirements defined in the Municipality of Anchorage's Department of Public Works Design Criteria Manual (2002, Chapter 1).



Freshwater wetlands covered by the Anchorage Wetland Management Plan (MOA 1996) have been given a designation based on each site's values and functions. These designations are based on a hierarchical value system, with "A" wetlands essentially representing the most important sites, "B" wetlands being of moderate to high values, and "C" sites representing the lower value areas. The "A," "B," and "C" designations are often termed Preservation Wetlands, Conservation Wetlands, and Developable Wetlands, respectively.

Wildlife Habitat

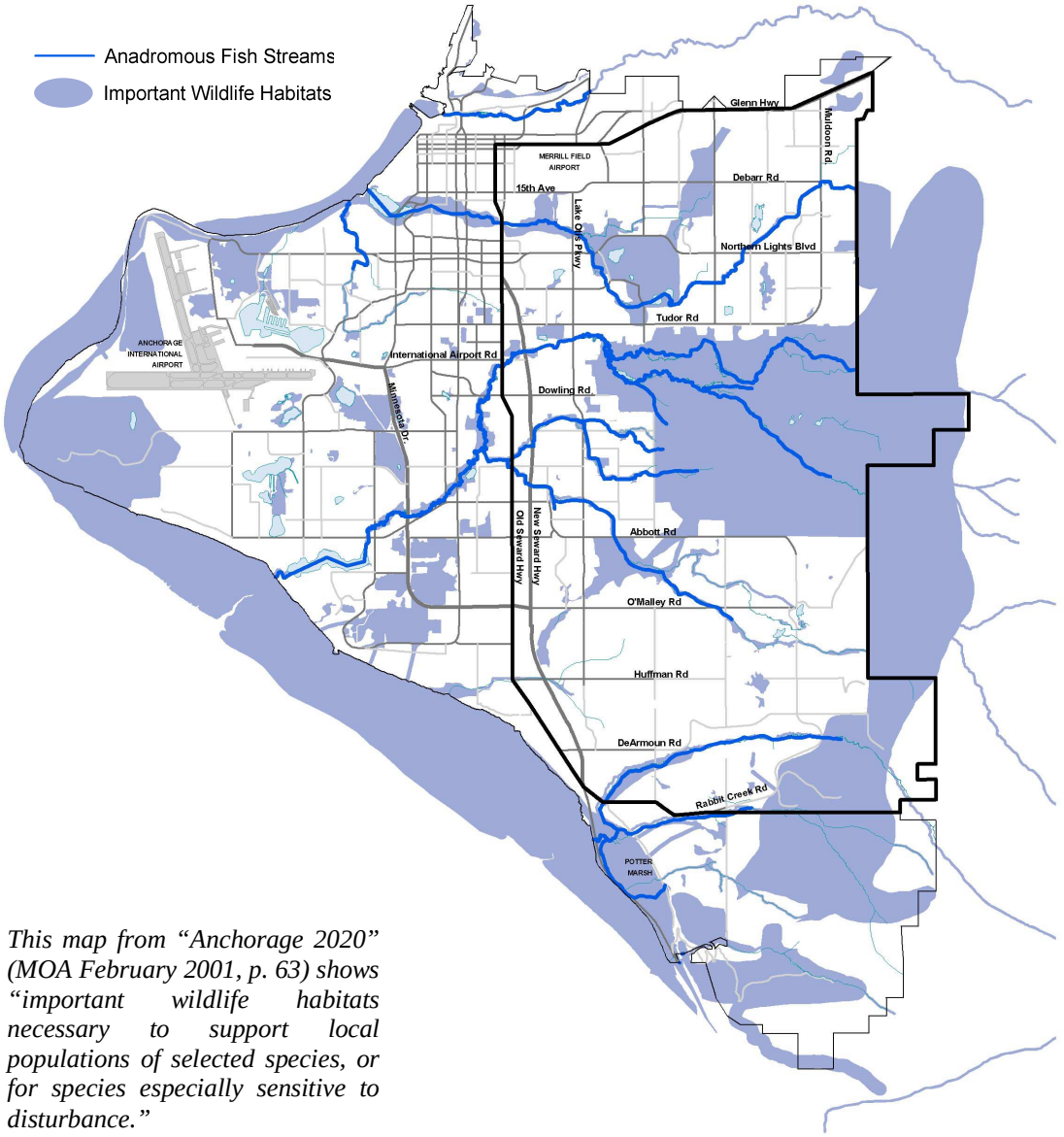
Criteria to be Measured:

- Acres and locations of wildlife habitat impacted.
- Number and locations of stream crossings (anadromous and non-anadromous) impacted.

"Anchorage 2020" indicates that Anchorage's flourishing populations of moose, bears, and other mammals usually associated with wilderness areas are a unique feature of our city, and it notes that residents value Anchorage's natural setting and connection to wildlife (p. 62). The plan also recognizes that transportation projects can affect habitat and conflict with wildlife.

> ***"Anchorage 2020" Wildlife Goal**: A wide diversity of fish, wildlife and habitats throughout the Municipality that thrives and flourishes in harmony with the community. (MOA February 2001, p. 39)*

This criterion will measure the amount of acreage that might be required to develop East Anchorage transportation system improvements. Wetland acreage that could be needed for the transportation improvements will be calculated based on right-of-way requirements as defined by the Municipality of Anchorage's Department of Public Works Design Criteria Manual (2002, Chapter 1) and compared against the Wildlife Habitat Map (right).



This map from "Anchorage 2020" (MOA February 2001, p. 63) shows "important wildlife habitats necessary to support local populations of selected species, or for species especially sensitive to disturbance."

Air Quality

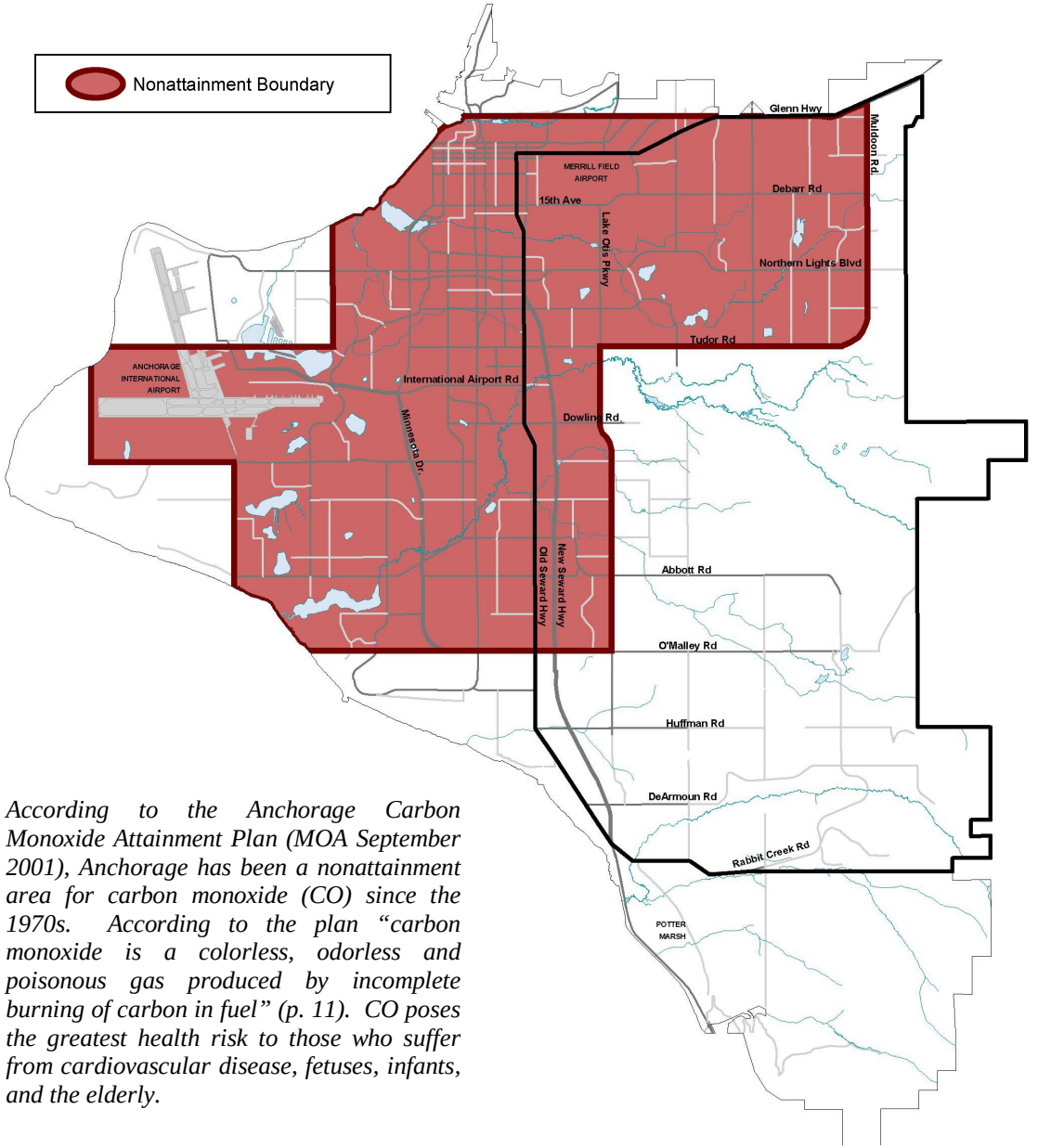
Criteria to be Measured:

- Vehicle miles traveled calculated per alternative.
- Vehicle miles traveled within the non-attainment area per alternative.
- Pounds of carbon monoxide per alternative.

Anchorage has had carbon monoxide (CO) air quality problems for nearly 25 years. In 1996, when Anchorage last violated the National Ambient Air Quality Standards, 74% of winter season CO emissions in Anchorage were from motor vehicles. Studies performed by the Municipality show that CO emissions from cold starts and warm-up idling make up a large portion of total emissions. Other substantive sources of CO in Anchorage include airport operations and residential wood burning (MOA September 2001).

> **"Anchorage 2020" Air Quality Goal:** *Clear healthful air that is free of noxious odors and pollutants. (MOA February 2001, p. 39)*

Because a major contributor to CO is vehicle travel, there is a correlation between the growth of vehicle miles traveled (VMT) and CO levels. Tracking and forecasting of VMT growth can be one means of flagging potential future growth in CO levels. The criteria proposed here will forecast the growth in vehicle miles traveled overall and within the Anchorage non-attainment area for each of the alternatives and compare that estimate with the base case. Traffic model outputs will be used in the Environmental Protection Agency's MOBILE 5b model to calculate the amount of CO anticipated with each of the improvements.



According to the Anchorage Carbon Monoxide Attainment Plan (MOA September 2001), Anchorage has been a nonattainment area for carbon monoxide (CO) since the 1970s. According to the plan "carbon monoxide is a colorless, odorless and poisonous gas produced by incomplete burning of carbon in fuel" (p. 11). CO poses the greatest health risk to those who suffer from cardiovascular disease, fetuses, infants, and the elderly.

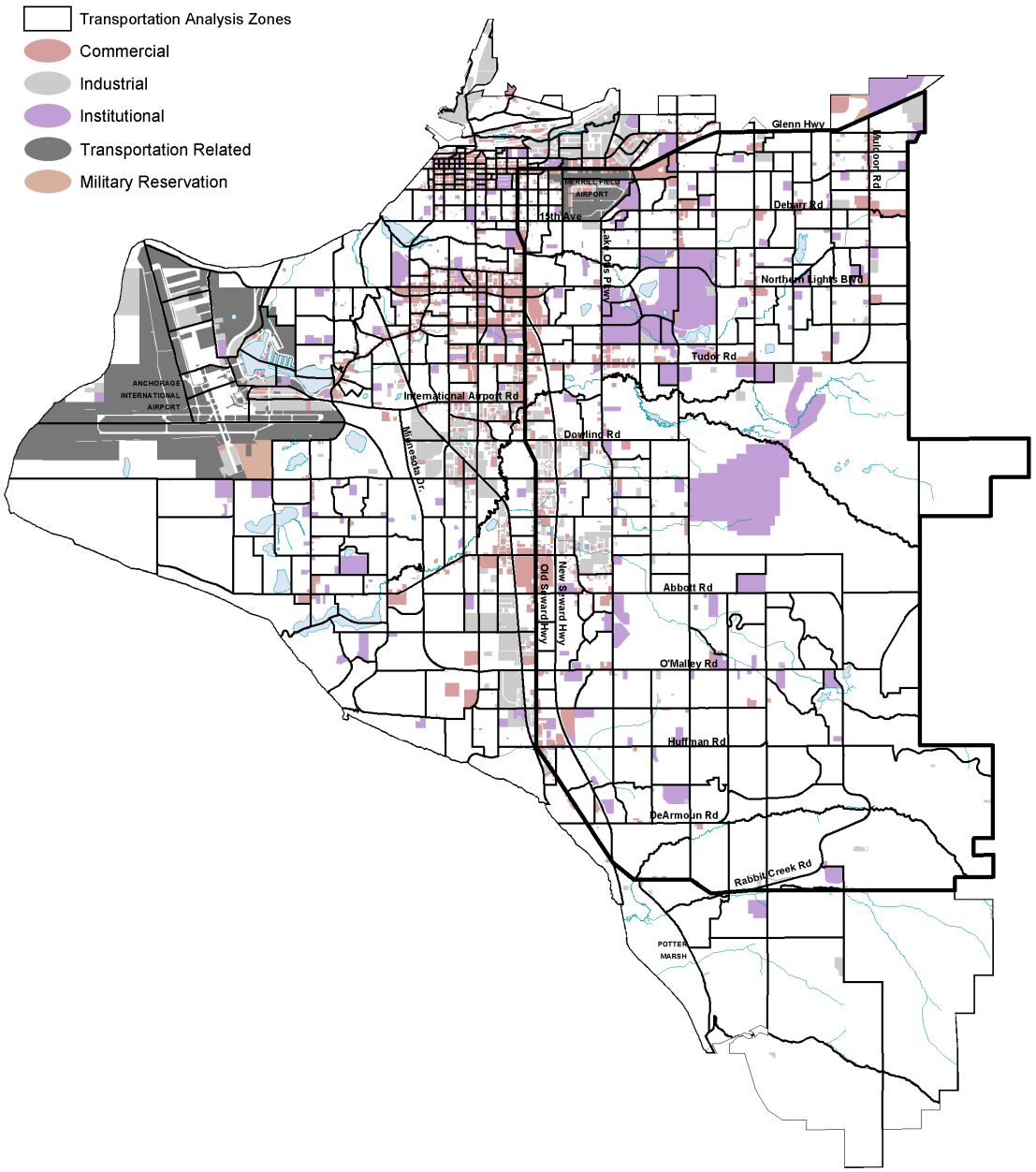
Economic Environment

Criteria to be Measured:

- Number of commercial business relocations.
- Employment projected by Transportation Analysis Zone.
- Employment density projected by Transportation Analysis Zone.

Anchorage planning documents realize the connection between transportation infrastructure and economic development. Plans call for a transportation system that promotes sustainable economic and industrial development; facilitates access to the port, international airport, railroad, and industrial reserves; concentrates employment; and minimizes the affect on existing businesses.

The criteria proposed in this section will gauge the affect that potential transportation improvements could have on business and industry by measuring the effects of potential business relocations, freight movement, and future employment distribution. The MOA's Transportation Model will be used to evaluate how employment distribution is anticipated to be affected by changes in accessibility. Business relocations will be calculated based on right-of-way requirements for each alternative evaluated.



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